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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

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To:

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in its capacity as elected Office

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| Date of mailing: <div style="text-align: center;">26 October 2000 (26.10.00)</div> | |
| International application No.: <div style="text-align: center;">PCT/AU00/00351</div> | Applicant's or agent's file reference: <div style="text-align: center;">2276022/PHH</div> |
| International filing date: <div style="text-align: center;">20 April 2000 (20.04.00)</div> | Priority date: <div style="text-align: center;">20 April 1999 (20.04.99)</div> |
| Applicant: <div style="text-align: center;">DRAGNE, Livia et al</div> | |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International preliminary Examining Authority on:

16 August 2000 (16.08.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

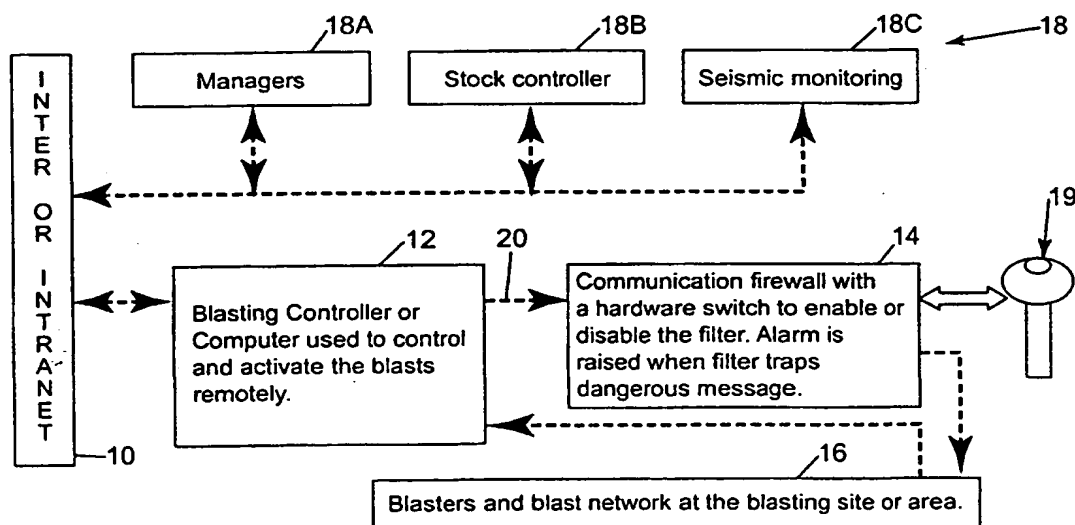
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| <p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p> | Authorized officer: <div style="text-align: center;">J. Zahra</div> Telephone No.: (41-22) 338.83.38 |
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (51) International Patent Classification ⁷ : F42D 5/00, 1/045, F42C 15/42 | A1 | (11) International Publication Number: WO 00/63636 (43) International Publication Date: 26 October 2000 (26.10.00) |
| <p>(21) International Application Number: PCT/AU00/00351</p> <p>(22) International Filing Date: 20 April 2000 (20.04.00)</p> <p>(30) Priority Data: 99/2823 20 April 1999 (20.04.99) ZA</p> <p>(71) Applicant (for all designated States except US): EXPERT EXPLOSIVES (PROPRIETARY) LIMITED [ZA/ZA]; 30 High Street, 2065 Modderfontein (ZA).</p> <p>(71) Applicant (for AU only): HUNTSMAN, Peter, Harold [AU/AU]; 1 Little Collins Street, Melbourne, VIC 3000 (AU).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): DIAGNE, Livia [RO/ZA]; 6 Pluto Avenue, Wilropark, 1724 Gauteng (ZA). PATZ, Vivian, Edward [ZA/ZA]; 314 Highland Road, Kensington, 2019 Johannesburg (ZA). HOOGENBOEZEM, Christiaan [ZA/ZA]; 76 Van Riebeeck Ave., 1619 Kempton Park (ZA).</p> <p>(74) Agents: HUNTSMAN, Peter, Harold et al.; Davies Collison Cave, 1 Little Collins Street, Melbourne, VIC 3000 (AU).</p> | <p>(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p> | |

(54) Title: METHOD OF AND SYSTEM FOR CONTROLLING A BLASTING NETWORK



(57) Abstract

A method and system for controlling a blasting network (16) for use where spurious command signals may be passed through a blasting controller (12) to the blasting network, for example when the controller is connected to the Internet or Intranet (10). The system includes a firewall (14) whereby the communication link (20) between the controller and the blasting network can be placed in a control mode by a switch (19). In the control mode, any previously designated unsafe message such as a fire command is prevented from reaching the blasting network by, for example, disregarding the unsafe message or scrambling it so that it is no longer unsafe. In an operational mode of the communication link, any scrambled unsafe message may be unscrambled and any unsafe message may be transmitted to the blasting network.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/00351

| A. CLASSIFICATION OF SUBJECT MATTER | | | | | | | | | | | | |
|--|--|---|--|---|---|--|---|--|--|---|--|--|
| Int. Cl. ⁷ : F42D 5/00, 1/045; F42C 15/42 | | | | | | | | | | | | |
| According to International Patent Classification (IPC) or to both national classification and IPC | | | | | | | | | | | | |
| B. FIELDS SEARCHED | | | | | | | | | | | | |
| Minimum documentation searched (classification system followed by classification symbols) IPC: F42D 5/00, 1/04, 1/045; F42C 15/40, 15/42 | | | | | | | | | | | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above | | | | | | | | | | | | |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI with keywords | | | | | | | | | | | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | | | | | | | | | | | |
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | | | | | | | | | | |
| X | US 5404820 A (HENDRIX) 11 April 1995 Whole document | 1-16 | | | | | | | | | | |
| Y | US 4674047 A (TYLER et al) 16 June 1987 Whole document | 1-16 | | | | | | | | | | |
| Y | AU 59457/96 A (DRAKE et al) 23 January 1997 Whole document | 1-16 | | | | | | | | | | |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex | | | | | | | | | | | | |
| <p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table> | | | "A" document defining the general state of the art which is not considered to be of particular relevance | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention | "E" earlier application or patent but published on or after the international filing date | "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone | "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art | "O" document referring to an oral disclosure, use, exhibition or other means | "&" document member of the same patent family | "P" document published prior to the international filing date but later than the priority date claimed | |
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| Date of the actual completion of the international search 12 May 2000 | | Date of mailing of the international search report 24 MAY 2000 | | | | | | | | | | |
| Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929 | | Authorized officer JEFFREY CARL Telephone No : (02) 6283 2543 | | | | | | | | | | |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/00351

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited in Search Report | | Patent Family Member | |
|--|----------|----------------------|----------|
| AU | 59457/96 | US | 6006328 |
| | | WO | 97/04394 |

END OF ANNEX

REC'D 20 MAR 2001

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| Applicant's or agent's file reference 2276022/PHH/HHF | FOR FURTHER ACTION. See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416). | |
| International Application No. PCT/AU00/00351 | International Filing Date (day/month/year) 20 April 2000 | Priority Date (day/month/year) 20 April 1999 |
| International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ F42D 5/00, 1/045; F42C 15/42 | | |
| Applicant EXPERT EXPLOSIVES (PROPRIETARY) LIMITED et al | | |

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheet(s).

- This report contains indications relating to the following items:

- | | |
|------|---|
| I | <input checked="" type="checkbox"/> Basis of the report |
| II | <input type="checkbox"/> Priority |
| III | <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| IV | <input type="checkbox"/> Lack of unity of invention |
| V | <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI | <input type="checkbox"/> Certain documents cited |
| VII | <input type="checkbox"/> Certain defects in the international application |
| VIII | <input type="checkbox"/> Certain observations on the international application |

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| Date of submission of the demand 16 August 2000 | Date of completion of the report 7 March 2001 |
| Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929 | Authorized Officer JEFFREY CARL Telephone No. (02) 6283 2543 |

I. Basis of the report**1. With regard to the elements of the international application:***

- ☐ the international application as originally filed.
- ☒ the description, pages **4-9**, as originally filed,
pages , filed with the demand,
pages **1-3**, received on **26 February 2001** with the letter of **23 February 2001**
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **10-11**, received on **26 February 2001** with the letter of **23 February 2001**
- ☒ the drawings, pages **1/4 - 4/4**, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☒ the claims, Nos. **1 and 8 as originally filed**
- ☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

| | | |
|-------------------------------|-------------|-----|
| Novelty (N) | Claims 1-14 | YES |
| | Claims | NO |
| Inventive step (IS) | Claims 1-14 | YES |
| | Claims | NO |
| Industrial applicability (IA) | Claims 1-14 | YES |
| | Claims | NO |

2. Citations and explanations (Rule 70.7)

Claims 1-14: The amended claims are directed to methods of controlling a blasting network and systems for controlling a blasting network; the methods and systems characterised by having a communication link operable in a control mode or an operational mode. In the control mode, the link is monitored for messages designated as "unsafe", and the "unsafe" messages are prevented from reaching the blasting network. In the operational mode, the designated "unsafe" messages are allowed to reach the blasting network. In both the operational and control modes, any message which has not been designated as "unsafe" is permitted to be transmitted via the communication link and hence the network is constantly activated.

No individual citation or obvious combination of citations disclose methods or systems for controlling a blasting network having a communication link with all of the features described above.

The closest art of US 5404820 does not detect or monitor "unsafe" messages and prevent them from being transmitted. Rather the citation uses a polarisation switch in an optical fibre network to either block a laser beam or allow the laser beam to be transmitted to the blasting network for activation of downstream devices or events. Therefore the citation discloses a blasting network that is either activated or deactivated.

REPLACED BY
ART 34 AMDT**METHOD OF AND SYSTEM FOR CONTROLLING A BLASTING NETWORK**Technical Field

- 5 This invention relates generally to a blasting system and is particularly concerned with a method of and system for controlling the operation of a blasting network.

Background of the Invention

- 10 For safety reasons a blast controlling system used for remotely controlling a blasting network has traditionally been isolated from other networks at a blasting site eg. at a mine. The data on the blasting system can however be used to monitor productivity, implement stock control and improve mining methods by making blast information available to those who need such information. It is also possible to schedule and initiate blasts from a central
15 control facility through a suitable blast controlling system.

- Another possibility which arises particularly due to the fact that computers are being used as top level system controllers for distributed networks of blasters is to make use of a computer network using Internet or Intranet capabilities. There are however inherent risks
20 associated with Internet connections. Chief of these is the risk that a hacker or unauthorised user may penetrate the system and deliberately or inadvertently generate an unsafe or dangerous command which can arm and fire the blasting system. This type of action can have catastrophic results.

25 Summary of the Invention

- The invention provides a method of controlling a blasting network which includes the steps of designating at least one unsafe message, placing a communication link to the network in a control mode, monitoring the communication link for the unsafe message, and preventing
30 the unsafe message, when detected, from reaching the blasting network.

- 2 -

The invention also provides a system for controlling a blasting network which includes a communication link for the network, the communication link being capable of being placed in a control mode, and a monitoring device for monitoring the communication link for at least one previously designated unsafe message, and wherein the communication link, when in its control mode, prevents any detected unsafe message from being transmitted to the blasting network.

Further according to the present invention there is provided a blasting system including a control system as described in the immediately preceding paragraph connected to a blasting network.

In the control mode of the communication link, the or each unsafe message may be prevented from reaching the blasting network simply by ignoring the message and not allowing its onward transmission. Alternatively the or each unsafe message may be scrambled so that it is no longer in an unsafe form.

"Unsafe message", as used herein, is used to designate a message or command which, if received by the blasting network, could result in unwanted or adverse conditions or consequences. For example arm and fire commands, if received by the blasting network at an unwanted time, could cause a blast to be initiated in the presence of personnel and thereby result in death or injury.

Preferably therefore the method of the invention includes the step of designating at least two unsafe messages of which two are respectively equated with arm and fire commands.

The communication link is preferably able to be placed in an operational mode in which any previously designated unsafe message is allowed to be transmitted to and reach the blasting network.

In an operational mode of the communication link, in which unsafe messages are allowed to be transmitted to the blasting network, any previously scrambled unsafe message may

be detected and unscrambled prior to transmitting the unscrambled unsafe message to the blasting network.

The communication link may be connected to a control unit which is capable of generating legal unsafe messages, for example legitimate arm and fire commands. However, unsafe messages may be categorised as legal or illegal. The latter group of messages includes those which are illegally generated, for example those messages which arise from any source other than the control unit connected to the communication link.

10 Brief Description of the Drawings

One embodiment of a control method and system according to the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a block diagram of an electronic blasting system including one embodiment of a control system according to the invention;

Figure 2 is a block diagram of a communication fire wall for use in the control system of Figure 1;

Figure 3 is a logical flowchart of the operation of a filter, used in the control system of Figure 1, according to a first form of the control system; and

Figure 4 is a flowchart similar to that shown in Figure 3 for a variation of the control system.

Description of Preferred Embodiment

When a blasting system is connected to an Intranet or Internet facility, access is provided to information stored in a data base associated with the blasting system. This information is useful inter alia to managers, personnel involved in stores and production, seismic monitoring installations, logistical control units, etc.

A perceived risk with a connection of the aforementioned kind is that unauthorised users may hack through the network security to tamper with the blasting system which is a safety critical system. An unanticipated system fault may result in the safety of the system being

CLAIMS:

1. A method of controlling a blasting network which includes the steps of designating at least one unsafe message, placing a communication link to the network in a control mode, monitoring the communication link for the unsafe message, and preventing the unsafe message when detected, from reaching the blasting network.
2. A method according to claim 1 which includes the step of placing the communication link in an operational mode in which any previously designated unsafe message is allowed to reach the blasting network.
3. A method according to claim 1 or claim 2 wherein in the control mode of the communication link the or each unsafe message is prevented from reaching the blasting network by preventing the onward transmission of the unsafe message.
4. A method according to claim 1 or claim 2 wherein in the control mode of the communication link the or each unsafe message is prevented from reaching the blasting network by scrambling the or each designated unsafe message so that it is no longer unsafe.
5. A method according to claim 4 which includes in an operational mode of the communication link in which unsafe messages are allowed to reach the blasting network the steps of detecting a scrambled unsafe message, unscrambling the detected scrambled unsafe message, and transmitting the unscrambled unsafe message to the blasting network.
6. A method according to any one of claims 1 to 5 which includes the step of designating at least two unsafe messages.
7. A method according to claim 6 wherein two designated unsafe messages are respectively equated with arm and fire commands.

8. A system for controlling a blasting network which includes a communication link for the network, the communication link being capable of being placed in a control mode, and a monitoring device for monitoring the communication link for at least one previously designated unsafe message, and wherein the communication link, when in its control
5 mode, prevents any detected unsafe message from being transmitted to the blasting network.
9. A control system according to claim 8 wherein the communication link is capable of being placed in an operational mode in which any previously designated unsafe message
10 is allowed to be transmitted to the blasting network.
10. A control system according to claim 8 or claim 9 wherein in the control mode of the communication link the or each unsafe message, when detected, is ignored.
- 15 11. A control system according to claim 8 or claim 9 wherein the or each unsafe message, when detected, is scrambled.
12. A control system according to claim 11 wherein in an operational mode of the communication link in which unsafe messages are allowed to be transmitted to the blasting
20 network any scrambled unsafe message is detected and unscrambled for transmission of the unscrambled unsafe message to the blasting network.
13. A control system according to any one of claims 8 to 12 wherein the communication link is connected to a control unit which is capable of generating legal
25 unsafe messages.
14. A control system according to any one of claims 8 to 13 wherein the monitoring device is a filter.
- 30 15. A control system according to any one of claims 8 to 14 wherein the communication link is placed in its control mode by means of a switch.

16. A blasting system including a control system according to any one of claims 8 to 15 connected to a blasting network.